

CLAIMS

1. A clogged filter detector for determining a level of obscuration of a flat filter disposed in an air conditioning system, said filter having a body and a peripheral frame and said system comprising a filter receptacle carried in a duct or plenum thereof, said receptacle including a plurality of rigid plates having surfaces generally parallel to a direction of air flow and defining outer walls of a structure into which a said filter may be removably inserted and retaining ledges connected to said plates and disposed perpendicular thereto, said plates and said ledges being adapted to come into contact with a said frame upon insertion of a said filter, said detector comprising:
 - an optical transmitter positioned to transmit a beam of light through a said filter,
 - a receiver including a sensor disposed to be contacted by said light beam after passing through said filter and further including means to provide an electrical signal representative of optical transmittance through said filter, said receiver and said filter aligned off-set from one another and said light beam non-parallel to air flow direction, and
 - support means for holding said transmitter and said receiver in an aligned position with respect to a selected area of said filter, said support means including a bracket comprising at least a first strip connectable to a said receptacle plate and said first strip being disposed for placement between a said plate and an edge portion edge of said filter upon insertion of the filter, and a first arm connected to said first strip and extending to a position opposing a face of said filter.
2. The clogged filter detector as defined in claim 1 wherein said support means comprises means for holding said transmitter and said receiver in an aligned position with respect to a selected area of said filter, said support means including a bracket comprising a first strip conforming to a said receptacle plate and at least one side strip connected to a said ledge and said first strip being disposed between a said plate and a side

edge of a said filter upon insertion of the filter, and a first arm connected to said side strip and extending to a position opposing a face of said filter.

3. The clogged filter detector as defined in claim 2 wherein said transmitter and said receiver are located in proximity to one another on one side of said filter and a reflector is located on an opposite side of the filter in position to receive light from transmitter after the light has passed through the filter and to reflect the light back through the filter to the receiver.
4. The clogged filter detector as defined in claim 3 wherein said filter is disposed across air duct at a selected angle, said reflector structure is generally parallel to said filter body and said transmitter and said receiver are aligned at an acute angle with respect to said filter.
5. The clogged filter detector as defined in claim 4 wherein said acute angle is 30 to 50 degrees.
6. The clogged filter detector as defined in claim 4 including a second arm connected to a side strip of said bracket, said first arm supporting said transmitter and said receiver and said second arm supporting said reflector.
7. The clogged filter detector as defined in claim 6 wherein said reflector is a retroreflector.
8. The clogged filter detector as defined in claim 7 wherein said second arm is pivotally mounted on said strip whereby said retroreflector may be adjustably placed in a selected position providing a clear path to said transmitter and said receiver.
9. The clogged filter detector as defined in claim 8 including a housing connected to said first arm and containing said transmitter and said receiver.
10. The clogged filter detector as defined in claim 2 including a second arm connected to a side strip of said bracket on a side of the filter opposite to said first arm and wherein said transmitter and said receiver are carried on separate arms on opposite sides of said filter.

11. The clogged filter detector as defined in claim 4 wherein said system includes a metal grill in close proximity to and facing said filter and said support means includes a structural component connected to said grill and carrying a reflector.
12. The clogged filter detector as defined in claim 11 wherein said structural component is magnetically connected to said grill.
13. The clogged filter detector as defined in claim 3 including means to compensate for adverse effects of reflection of light from a surface of said filter.
14. The clogged filter detector as defined in claim 13 wherein said compensating means comprises a pair of polarizing filters and a quarter wave retarder disposed between said transmitter and said reflector.
15. A clogged filter detector for determining a level of obscuration of a filter in an air circulation system and providing a perceptible indication when said level exceeds a predetermined level, said filter having a body and a peripheral frame and said system comprising a filter receptacle carried in a duct or plenum thereof, said receptacle including a plurality of rigid plates having surfaces generally parallel to a direction of air flow and defining outer walls of a structure into which a said filter may be removably inserted and retaining ledges connected to said plates and disposed perpendicular thereto, said plates and said ledges being adapted to come into contact with a said frame upon insertion of a said filter, said detector comprising:
 - an optical transmitter positioned to transmit a beam of light through a said filter,
 - a receiver including a sensor disposed to be contacted by said light beam after passing through said filter,
 - a processing assembly further comprising a microprocessor having a digital memory in which a predetermined level of obscuration has been entered, means for converting a detected optical signal to electrical form, digitizing the resulting electrical signal and comparing the detected signal level with said predetermined level and for providing perceptible

indication when said detection signal level drops below said predetermined level, and support means for holding said transmitter and said receiver in an aligned position with respect to a selected area of said filter, said support means including a bracket comprising a first strip conforming to a said receptacle plate and at least one side strip connected to a said ledge and said first strip being disposed between a said plate and a side edge of a said filter upon insertion of the filter, and a first arm connected to said side strip and extending to a position opposing a face of said filter.

16. The clogged filter detector as defined in claim 15 including means for entering and storing an initial clean filter obscuration reference level.
17. The clogged filter detector as defined in claim 15 including means for transmitting an indication signal to a remote location.
18. The clogged filter detector as defined in claim 15 wherein said transmitter and said receiver are located in proximity to one another on one side of said filter and a retroreflector is located on an opposite side of the filter in position to receive light from transmitter after the light has passed through the filter and to reflect the light back through the filter to the receiver.
19. The clogged filter detector as defined in claim 15 including a second arm connected to a side strip of said bracket on a side of the filter opposite to said first arm and wherein said transmitter and said receiver are carried on separate arms on opposite sides of said filter.
20. A clogged filter detector for determining a level of obscuration of a filter disposed in an air conditioning system, said filter having a body and a peripheral frame and said system comprising a filter receptacle carried in a duct or plenum thereof, said receptacle including a plurality of rigid plates having surfaces generally parallel to a direction of air flow and defining outer walls of a structure into which a said filter may be removably inserted and retaining ledges connected to said plates and disposed perpendicular thereto, said plates and said ledges being

adapted to come into contact with a said frame upon insertion of a said filter, said detector comprising:

an optical transmitter positioned to transmit a beam of light through a said filter,

a receiver including a sensor disposed to be contacted by said light beam after passing through said filter and further including means to provide an electrical signal representative of optical transmittance through said filter, and

support means for holding said transmitter and said receiver in an aligned position with respect to a selected area of said filter, said support means including a first arm attached to a said retaining ledge and at least one side strip connected to a said rigid plate and a second arm attached to said side strip and upon insertion of the filter, movable into aligned position with respect to said transmitter and said receiver.

21. The clogged filter as defined in claim 1 wherein a selected one of said transmitter and receiver components is located in a cantilevered position spaced apart from said filter, of non selected one of said components is located adjacent to said filter and including a resilient structural member disposed in contact with said filter to obtain a more even surface of the filter whereby fluffy material of the filter surface may be depressed, and dust and lint are enabled to freely enter space near the non selected component.
22. The clogged filter as defined in claim 15 including an external sensitivity control enabling adjustment of sensitivity for the type of filter and environment encountered.
23. The clogged filter detector as defined in claim 15 including an aural device providing a perceptible aural indication upon expiration of a predetermined delay.